

What is claimed is:

1. A method for generating an X-ray image, comprising the step of:
- (a) providing a portable X-ray device, comprising:
 - an enclosure;
 - an X-ray tube mounted within the enclosure;
 - a collimated tube mounted to the enclosure and positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;
 - wiring extending between an interior of the enclosure and an exterior of the enclosure and operative to couple an external power supply to the X-ray tube; and
 - power supply circuitry operative to generate a voltage to drive the X-ray tube, wherein the power supply circuitry is not contained within the enclosure and is coupled to the enclosure by the wiring;
 - whereby a weight of the enclosure is significantly reduced;
 - (b) providing an articulating arm having a connector thereon, adapted to couple the X-ray device to the articulating arm;
 - (c) coupling the X-ray device to the articulating arm;
 - (d) aiming the collimated tube at an X-ray image receptor;
 - (e) moving the articulated arm such that a structure to be imaged is positioned between the collimated tube and the receptor;
 - (f) depressing an enable switch; and
 - (g) depressing an exposure switch, wherein the X-ray device will not emit X-rays unless both the enable switch and the exposure switch are depressed.

2. The method of claim 1, wherein the enable switch and the exposure switch are coupled to the X-ray device by wireless remote control.

3. The method of claim 1, wherein the enclosure comprises a handle configured to be held by a single hand.

4. A method for generating an X-ray image, comprising the steps of:

(a) providing a portable X-ray device, comprising:

an enclosure;

an X-ray tube mounted within the enclosure;

a collimated tube mounted to the enclosure and positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

wiring extending between an interior of the enclosure and an exterior of the enclosure and operative to couple an external power supply to the X-ray tube;

an enable switch mounted to the enclosure; and

an exposure switch mounted to the enclosure;

wherein the X-ray tube will only emit X-rays when the enable switch and the exposure switch are both depressed;

(b) grasping the enclosure;

(c) depressing the enable switch with a first finger;

(d) aiming the collimated tube at an X-ray image receptor, wherein a structure to be imaged is positioned between the collimated tube and the receptor; and

(e) depressing the exposure switch with a second finger while holding the enable switch in a depressed position.

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5. The method of claim 4, wherein the enclosure comprises a handle configured to be held by a single hand.

6. A portable X-ray device, comprising:

an enclosure;

an X-ray tube mounted within the enclosure;

a collimated tube mounted to the enclosure and positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

wiring extending between an interior of the enclosure and an exterior of the enclosure and operative to couple an external power supply to the X-ray tube;

an enable switch mounted to the enclosure; and

an exposure switch mounted to the enclosure;

wherein the X-ray tube will only emit X-rays when the enable switch and the exposure switch are both depressed.

7. The portable X-ray device of claim 6, further comprising:

power supply circuitry operative to generate a voltage to drive the X-ray tube; and

control circuitry operative to control an exposure time of the X-ray tube;

wherein the power supply circuitry and the control circuitry are not contained within the enclosure and are coupled to the enclosure by the wiring;

whereby a weight of the handle is significantly reduced.

8. The portable X-ray device of claim 7, wherein the control circuitry causes a warm-up current to be applied to the X-ray tube when the enable switch is depressed.

9. The portable X-ray device of claim 7, wherein the control circuitry causes the power supply circuitry to generate the drive voltage when the exposure switch is depressed.

10. The portable X-ray device of claim 6, further comprising:

a multi-pin connector coupled to the enclosure and conductively coupled to the wiring.

11. The portable X-ray device of claim 6, further comprising:

an image receptor holder coupled to the collimated tube, the holder comprising:

a horizontal member having proximal and distal ends;

a vertical member attached to the horizontal member distal end and extending transversely thereto; and

a transverse sliding member mounted to the horizontal member and operative to slide thereon in a longitudinal direction;

wherein an X-ray image receptor may be held between the vertical member and the sliding member.

12. The portable X-ray device of claim 11, wherein the X-ray image receptor is a CCD array.

13. The portable X-ray device of claim 6, further comprising:

an articulating arm having a connector thereon adapted to couple the enclosure to the articulating arm, wherein a position of the connector with respect to a patient is adjustable.

14. A portable X-ray device, comprising:

an enclosure;

an X-ray tube mounted within the enclosure;

a collimated tube mounted to the enclosure and positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

wiring extending between an interior of the enclosure and an exterior of the enclosure and operative to couple an external power supply to the X-ray tube;

power supply circuitry operative to generate a voltage to drive the X-ray tube, wherein the power supply circuitry is not contained within the enclosure and is coupled to the enclosure by the wiring;

whereby a weight of the enclosure is significantly reduced; and

an articulating arm having a connector thereon releasably coupling the enclosure to the articulating arm.

15. The portable X-ray device of claim 14, further comprising:

control circuitry operative to control an exposure time of the X-ray tube, wherein the control circuitry is not contained within the enclosure and is coupled to the enclosure by the wiring;

whereby the weight of the enclosure is significantly reduced.

16. The portable X-ray device of claim 15, further comprising:

a remote control receiver coupled to the power supply and control circuitry; and

a remote control transmitter operable for wireless transmission of an enable signal and an exposure signal to the remote control receiver.

17. The portable X-ray device of claim 16, wherein the control circuitry causes a warm-up current to be applied to the X-ray tube when the enable signal is received by the remote control receiver.

18. The portable X-ray device of claim 16, wherein the control circuitry causes the power supply circuitry to generate the drive voltage when the exposure signal is received by the remote control receiver.

19. The portable X-ray device of claim 14, further comprising:

a multi-pin connector coupled to the enclosure and conductively coupled to the wiring.

20. The portable X-ray device of claim 14, further comprising:

an image receptor holder coupled to the collimated tube, the holder comprising:

a horizontal member having proximal and distal ends;

a vertical member attached to the horizontal member distal end and extending transversely thereto; and

a transverse sliding member mounted to the horizontal member and operative to slide thereon in a longitudinal direction;

wherein an X-ray image receptor may be held between the vertical member and the sliding member.

21. An X-ray device, comprising:

an X-ray tube;

a collimated tube positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

a slot formed through a surface of the collimated tube; and

a filter removably inserted through the slot, such that an X-ray beam passing through the collimated tube will also pass through the filter.

22. An X-ray device, comprising:

an X-ray tube;

a collimated tube positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

at least one docking slot formed into the collimated tube; and

an image receptor holder including a positioning bar configured to mate with the at least one docking slot;

wherein the image receptor is positioned at a fixed, stable location with respect to the collimated tube, thereby facilitating proper imaging on the image receptor.

23. The X-ray device of claim 22, wherein the image receptor holder includes an integral CCD receptor.

24. The X-ray device of claim 23, further comprising:

an electronic communication path formed with the positioning bar, the communication path having a first end coupled to the CCD receptor and a second end terminating in a first electrical connector.

25. The X-ray device of claim 24, further comprising:

a second electrical connector positioned in the at least one docking slot, wherein the first and second electrical connectors mate when the positioning bar is mated with the docking slot.

26. The X-ray device of claim 24, wherein the communication path comprises a multi-conductor wire.

27. The X-ray device of claim 22, wherein the image receptor holder further comprises:

a horizontal member coupled to the positioning bar; and

a vertical member adjustably coupled to the horizontal member such that a relative angle of the vertical member with respect to the horizontal member may be changed by an operator of the device;

wherein the vertical member is adapted to hold an image receptor.

28. The X-ray device of claim 27, wherein the vertical member includes a CCD sensor integrally formed therewith.

29. The X-ray device of claim 27, wherein the horizontal member includes a multi-sided protrusion and the vertical member includes a multi-sided hole, whereby interaction of the protrusion with the hole allows the relative angle of the vertical member with respect to the horizontal member to be changed by the operator.

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30. An X-ray image receptor holder adapted to be coupled to a source of X-rays, the holder comprising:

a horizontal member;

a vertical member adjustably coupled to the horizontal member such that a relative angle of the vertical member with respect to the horizontal member may be changed by an operator of the device;

wherein the vertical member is adapted to hold an image receptor.

31. The X-ray image receptor holder of claim 30, wherein the vertical member includes a CCD sensor integrally formed therewith.

32. The X-ray image receptor holder of claim 30, wherein the horizontal member includes a multi-sided protrusion and the vertical member includes a multi-sided hole, whereby interaction of the protrusion with the hole allows the relative angle of the vertical member with respect to the horizontal member to be changed by the operator.

33/ 33. A portable X-ray device, comprising:

a handle;

an X-ray tube mounted within the handle;

a collimated tube mounted to the handle and positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

wiring extending between an interior of the handle and an exterior of the handle and operative to couple an external power supply to the X-ray tube;

first and second handgrips integrally formed with the handle;

an enable switch mounted to the handle; and

an exposure switch mounted to the handle;

wherein the X-ray tube will only emit X-rays when the enable switch and the exposure switch are both depressed.

33/ 33/ 24. The portable X-ray device of claim 33, wherein:

the enable switch is located on the first handgrip; and

the exposure switch is located on the second handgrip.

34/35. An X-ray device, comprising:

an enclosure;

an X-ray tube mounted within the enclosure;

a collimated tube mounted to the enclosure and positioned such that X-rays will be emitted into the collimated tube when the X-ray tube is activated;

power supply circuitry coupled to the X-ray tube and operative to generate a voltage to drive the X-ray tube;

an image receptor positioned to receive X-rays emitted by the X-ray tube and having an image receptor output producing electronic signals representative of an X-ray image detected by the image receptor;

processing circuitry coupled to the image receptor output, the processing circuitry producing a processed output comprising image data for display; and

a display window coupled to the processed output and operative to display the image data.

36. The X-ray device of claim ³⁴35, wherein the enclosure comprises a handle configured to be held by a single hand.

37. The X-ray device of claim ³⁴35, wherein the image receptor comprises a CCD array.

38. The X-ray device of claim ³⁴35, wherein the image receptor is coupled to the collimated tube.

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39. The X-ray device of claim ~~35~~³⁴, wherein the processing circuitry comprises a microprocessor.

40. The X-ray device of claim ~~35~~³⁴, wherein the display window comprises a CRT.

~~35~~³⁴ 41. The X-ray device of claim ~~35~~³⁴, wherein the display window comprises a liquid crystal display.

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